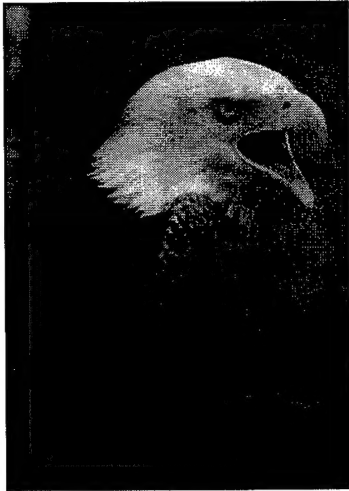




Riparian Raptors Potentially Impacted by USACE Reservoir Operations



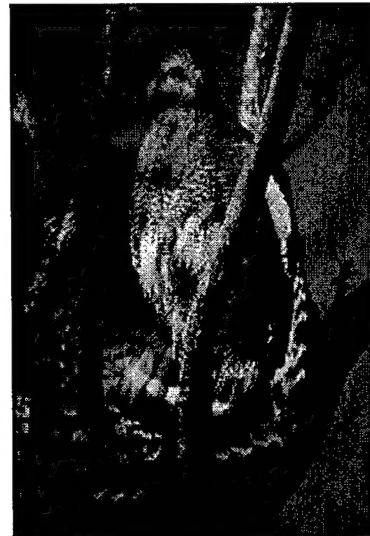
Bald Eagle (Photo by Tom Barnes)



Osprey (Photo by Les Turner)



Peregrine Falcon (Photo by Greg Gothard)



Red-shouldered hawk (Photo by Victor W. Fazio, III)

PURPOSE: This is the first in a series of technical notes concerning riparian species that are potentially impacted by U.S. Army Corps of Engineers (Corps) reservoir operations. These technical notes are products of the Ecosystem Management and Restoration Research Program (EMRRP) work unit on reservoir operations (Dickerson, Martin, and Allen 1999; Kasul, Martin, and Allen 1999). Background information is provided on four raptors (bald eagle, osprey, peregrine falcon, and red-shouldered hawk). Habitat requirements of each of these species are discussed, and information is provided concerning the impacts responsible for declines in the populations of these raptors, as well as recovery efforts. Details on the status of each raptor species, its distribution, habitat, behavior, reproduction, food habits, impacts, and management are provided in separate technical notes (ERDC Technical Notes EMRRP-SI-12 through EMRRP-SI-15). Links to these additional technical notes can be found on page 4.

Because of large population declines, the peregrine falcon was listed as federally endangered in 1970, and the bald eagle was listed as federally endangered in 1978 in all except five of the lower 48 states, where it was listed as threatened. The osprey and red-shouldered hawk have never been listed as federally threatened or endangered. However, the osprey has been a species of concern for more than 30 years because of major population declines following the introduction of organochlorine pesticides around 1950. Intensive recovery efforts have been successful in reestablishing populations of the bald eagle, peregrine falcon, and osprey. The bald eagle was reclassified to federally threatened in 1995, and the peregrine falcon was federally delisted in 1999. These species are still considered endangered in many states; the osprey and red-shouldered hawk are considered threatened or endangered in a few states. The current federal status of these four raptors is summarized in Table 1, and the known state status is provided in Table 2.

Table 1 Summary Status of Riparian Raptors Potentially Impacted by Reservoir Operations¹		
Common Name	Scientific Name	Protection Status ¹
Bald eagle	<i>Haliaeetus leucocephalus</i>	Federally threatened Bald Eagle Protection Act
Osprey	<i>Pandion haliaetus</i>	State protected in 31 states
Peregrine falcon	<i>Falco peregrinus</i>	State protected in 45 states
Red-shouldered hawk	<i>Buteo lineatus</i>	State protected in 18 states
¹ . Indicates priority level of protection. Refer to Table 2 for details.		

A recent survey conducted as part of the EMRRP work unit entitled "Reservoir Operations -Impacts on Habitats of Target Species" indicated that these four raptor species were a concern on Corps projects. The bald eagle was reported to occur on 50 projects in 19 Districts across the United States. The osprey was reported at 10 projects in 4 Districts, mostly in the East. Although the red-shouldered hawk was reported as a species of concern on only 1 project in the Rock Island District, it is most likely present on numerous other projects. It is a forest dweller and therefore less visible than the larger raptors that nest and hunt in open habitats. Adequate surveys have not been conducted to determine the population size of this hawk, since it has had no federal status and is considered endangered in only a few states. The peregrine falcon was reported to occur on 3 projects, but most Corps projects in its breeding range do not provide appropriate nesting habitat. Because of the severe declines in bald eagle and osprey populations during the middle to latter 20th century, these species have received protection and management on the projects where they occur.

HABITAT REQUIREMENTS: These four riparian raptors prefer habitats associated with water or wetland sites. Diets of the osprey and bald eagle consist primarily of fish, whereas the peregrine feeds chiefly on birds; the red-shouldered hawk preys on small mammals, birds, reptiles, and amphibians. Ospreys and bald eagles usually forage in large bodies of water and nest in large trees or snags near foraging sites. The red-shouldered hawk prefers hardwood forests in riparian areas, especially mature floodplain forests that have large trees for nests and hunting perches. The peregrine falcon is found in a variety of large open habitats but prefers those along lakes and streams that provide corridors between nesting and hunting sites; it utilizes high ledges rather than trees for nesting. Because of the need for strong stable nests, ospreys, eagles, and peregrines have readily used man-made structures provided in management programs.

IMPACTS AND RECOVERY: The impacts responsible for declines of these raptor populations have resulted from man's activities. In the early 1900s all were subjected to indiscriminate killing, particularly shooting and trapping; ignorance concerning the ecological role of raptors allowed such practices to exist and continue into the mid-20th century. Habitat loss to agriculture, logging, and urban development has particularly affected the bald eagle, osprey, and red-shouldered hawk. The latter may have been more adversely affected because it is a forest species, and these activities have resulted in the disappearance and fragmentation of its natural habitat. The major impact to declines of the bald eagle, osprey, and peregrine falcon after 1950 was the widespread use of organochlorine pesticides (especially DDT and DDE) and other environmental pollutants such as mercury, lead, and polychlorinated biphenyls (PCBs). These chemicals accumulate in the tissues of prey species and interfere with reproduction when ingested by raptors. Current impacts on these raptor populations result chiefly from increased human disturbance and land-use practices (e.g., construction, logging, recreation) that destroy or degrade nesting and feeding habitat.

The bald eagle, peregrine falcon, and osprey have received protection under the Lacey Act (1900), designed to stop the commercial market for birds, and the Migratory Bird Treaty Act (1916) between the United States and Mexico. The Bald Eagle Protection Act was passed in 1940 in an attempt to curb rapidly declining eagle populations. However, the Endangered Species Act (ESA) passed in 1973 afforded strong enforcement of laws against killing and nest destruction of both the bald eagle and peregrine falcon. The banning of organochlorine pesticides in 1972 greatly influenced the natural recovery of all three raptor populations.

After passage of the ESA, recovery programs were developed for all endangered species that focused on the following tasks: (1) protection from killing and destruction of nest sites; (2) provision of nest sites (platforms or ledges); (3) protection of habitat around nests; (4) restoration of birds to the wild; and (5) public education and engagement in recovery efforts. Although protection of species and habitats was essential, active management was the cornerstone of the recovery effort. Management techniques that have been particularly effective for these raptors during the past two decades are the provision of man-made nest sites and restoration of birds to the wild. Ospreys, in particular, have shown an affinity for nesting on platforms and have become reestablished in areas where platforms have been provided. Juvenile eagles, ospreys, and peregrine falcons have been introduced into the wild by hacking and are now returning to hacking areas or nearby habitats to establish populations. Hacking consists of releasing fledglings into appropriate habitats from a cage atop a hacking tower, which contains a simulated natural nest. The young birds return to the tower to roost and receive food until their hunting skills have fully developed. Hacking orients the young birds to the area, and biologists believe that most individuals will return to breed in the same general area upon maturity.

Many Corps projects implemented recovery efforts for eagles and ospreys, which are likely to breed on or visit project sites in their ranges since these projects usually provide appropriate habitat with abundant food resources. Eagle nesting sites have been protected and maintained, and man-made osprey nest platforms have met with success at a number of Corps projects. Projects in at least five Districts in the Southeast and Midwest have successfully hacked eagles (Fischer 2000), and projects in at least seven Districts in the East and Midwest have hacked ospreys. The St. Louis District reports having hacked peregrine falcons in the early 1990s.

Management at Corps projects should primarily benefit these four raptor species rather than adversely impact them. Forest management practices tend to provide large, dominant trees for nests and perches, and lakes with good water quality usually support fish and migratory waterfowl populations. Although not federally endangered, species such as the osprey and red-shouldered hawk should benefit under current stewardship policy. ER 1130-2-540, "Environmental Stewardship Operations and Maintenance Policies," provides justification for directing management efforts toward high-priority species of wildlife. Bald eagles are still federally threatened; peregrines and ospreys are considered endangered in some states, and the osprey and red-shouldered hawk are species of special concern in other states. Potential habitat should be surveyed to document the occurrence of the red-shouldered hawk on Corps lands, and steps should be taken to maintain appropriate nesting habitat. Projects should be aware of the need to lessen impacts associated with construction and recreation that occur on Corps lands.

SPECIES PROFILES: Profiles of these riparian raptors are published as separate technical notes and linked to this technical note. The titles and publication numbers of the profiles are as follows:

Riparian Raptors on USACE Projects: Bald Eagle	Technical Note EMRRP-SI-12
Riparian Raptors on USACE Projects: Osprey	Technical Note EMRRP-SI-13
Riparian Raptors on USACE Projects: Peregrine Falcon	Technical Note EMRRP-SI-14
Riparian Raptors on USACE Projects: Red-shouldered Hawk	Technical Note EMRRP-SI-15

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Mitchell, W. A., Guilfoyle, M. P., Wolters, M. S., and Martin, C. O. (2000). "Riparian raptors potentially impacted by USACE reservoir operations," *EMRRP Technical Notes Collection* (ERDC TN-EMRRP-SI-11), U.S. Army Engineer Research and Development Center, Vicksburg, MS. www.wes.army.mil/el/emrrp

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- Kasul, R. L., Martin, C. O., and Allen, H. H. (1999). "Characterization of sensitive species and habitats affected by operation of USACE water resource development projects," *EMRRP Technical Notes Collection* (TN EMRRP-SI-10). U.S. Army Engineer Research and Development Center, Vicksburg, MS. www.wes.army.mil/el/emrrp

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Table 2
State Protection Status of Riparian Raptors

States	Bald Eagle ¹	Osprey	Peregrine Falcon	Red-shouldered Hawk
Pacific				
CA	SE	SSC	SE	SSC
ID	SE		SE	
NV	SP	WL	SP	
OR	ST		SE	
WA	ST	SSC	SE	
HI				
Southwest				
AZ	FT ²			
NM	ST	SSC	SE	
OK	SE		SE	
TX	ST		SE	
Great Lakes-Big Rivers				
IL	ST	SE	SE	ST
IN	SE	SE	SE	SSC
IA	SE		SE	SE
MI	ST	ST	SE	ST
MO	SE	SSC	SE	SSC
MN	SSC		ST	SSC
OH	SE	SE	SE	SSC
WI	SSC	ST	SE	ST
Southeast				
AL	SP	SP	SP	
AR	FT ²	SSC		SSC
FL	ST	SSC ³	SE	
GA	SE	SSC	SE	
KY	SE	ST	SE	
LA	FT ²	SSC	SE	
MS	SE	SSC	SE	
NC	SE ⁴		SE	

(Continued)

¹ The federally threatened status of the bald eagle takes precedence over state listings.

² State uses federal status as their designation.

³ Monroe County only.

⁴ Proposed state status is threatened.

FE= Federally endangered species.

FT= Federally threatened species.

SE= State endangered species.

ST= State threatened species.

SP= State protected.

SSC= State species of special concern.

WL= State watch list species (no state protection).

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Table 2 (Concluded)				
States	Bald Eagle	Osprey	Peregrine Falcon	Red-shouldered Hawk
Southeast (Concluded)				
SC	FT ²		SE	
TN	ST	ST	SE	SSC
Northeast				
CT	SE		SE	SSC
DE	SE	SSC	SSC	SSC
ME	ST		SE	
MD	SE		SE	
MA	SE		SE	
NH	SE	ST	SE	SSC
NJ	SE	ST	SE	SE/ST ⁵
NY	ST	SSC	SE	SSC
PA	SE	SE ⁶	SE	
RI	FT ²	SSC		
VT	SE	SE	SE	
VA	ST	SE		
WV	FT ²	SSC	SSC	
Mountain-Prairie				
CO	ST	SSC	SSC	
KS	SE		SE	SSC
MT	SP		SE	
ND	SE	SSC	SE	
NE	SE		SE	SSC
SD	SE	ST	SE	
UT	ST	SSC	SE	
WY	FT ²		SSC	
Alaska				
AK		SSC ⁷	SSC	
Total States	48	32	45	18
⁵ Breeding = endangered; nesting = threatened. ⁶ Proposed state status is threatened. ⁷ Listed as U.S. Forest Service sensitive species.				